More about matplotlib

Software 1 – Python Exercises for Mathematics

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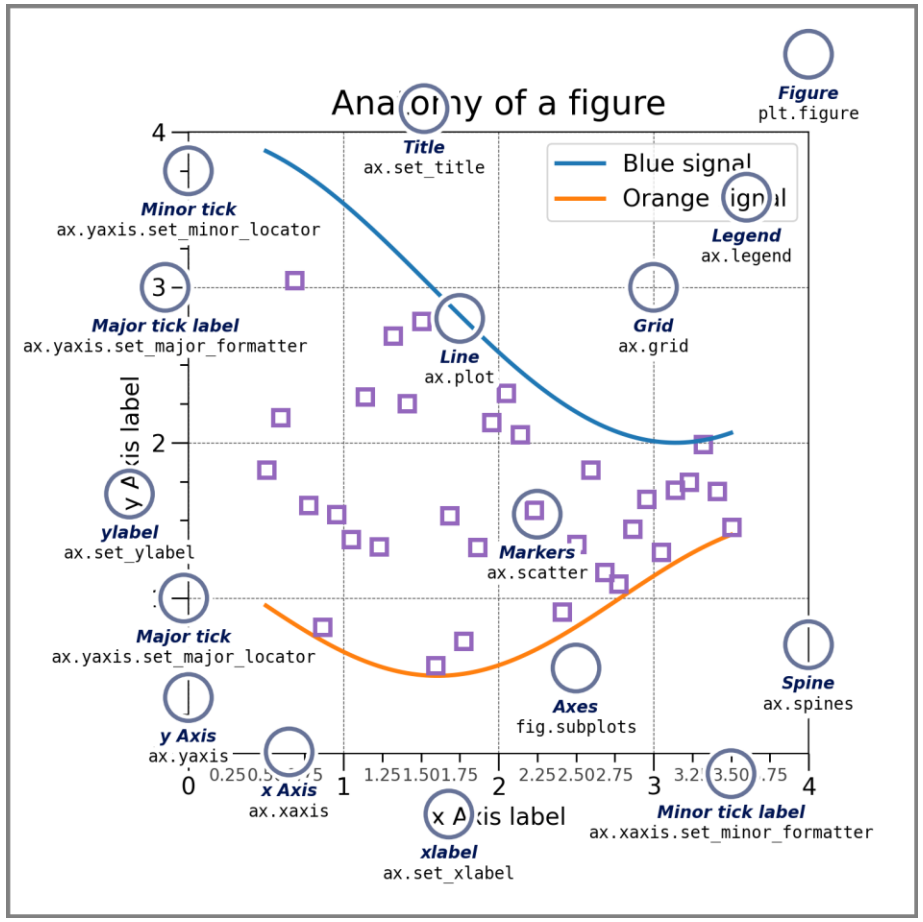
Contents

Anatomy of a figure



Basic components of a figure:

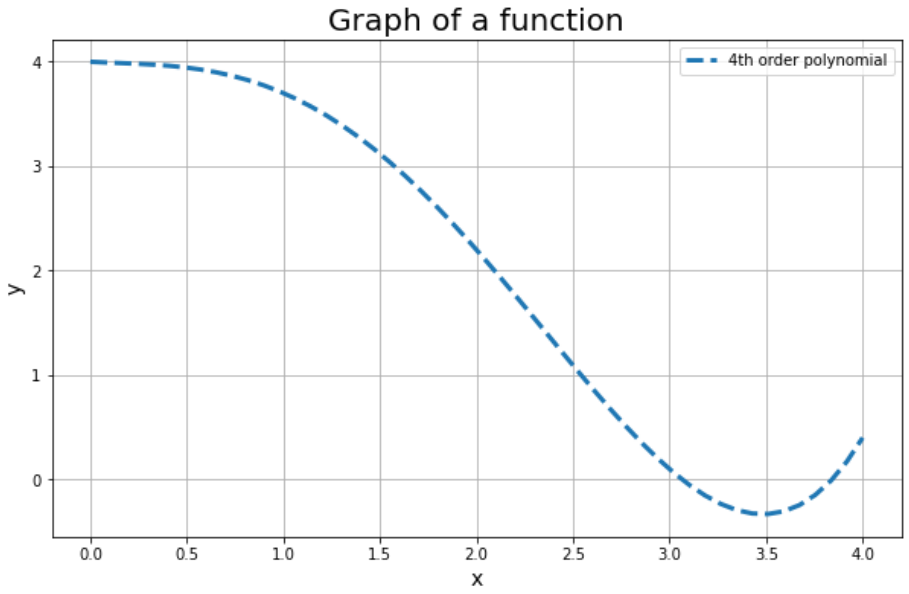
- Figure
- Axes
- Line
- Xlabel
- Ylabel
- X Axis
- Y Axis
- Legend

[Basic Usage — Matplotlib 3.5.3 documentation]

Components of a figure - Example

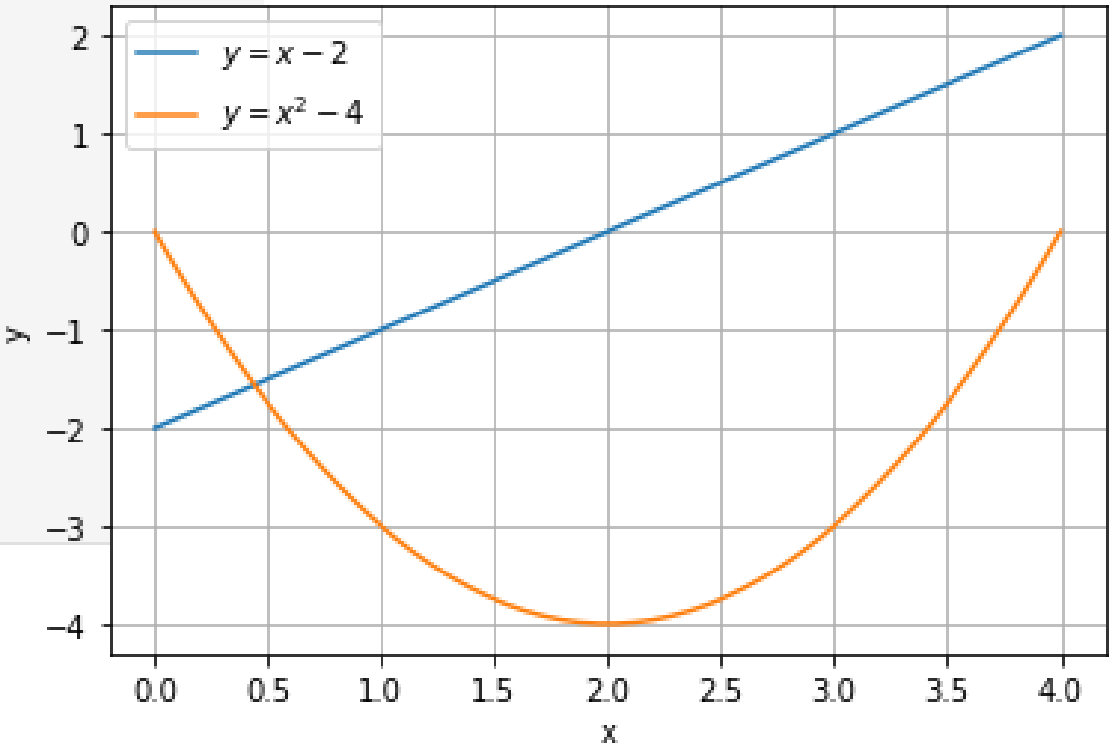
[1]:
```
import numpy as np
import matplotlib.pyplot as plt
```

[2]:
```
# Create example data, the 4th order polynomial function
x = np.linspace(0, 4)
y = 0.1*x**4 - 0.5*x**3 + 0.2*x**2 - 0.1*x + 4

fig, ax = plt.subplots(figsize = (10, 6))  # a figure with a single Axes

plt.plot(x, y, linestyle = '--', linewidth = 3, label = '4th order polynomial')
plt.grid(True)
plt.xlabel('x', fontsize = 14)
plt.ylabel('y', fontsize = 14)
plt.title('Graph of a function', fontsize = 20)
plt.legend()
plt.show()
```



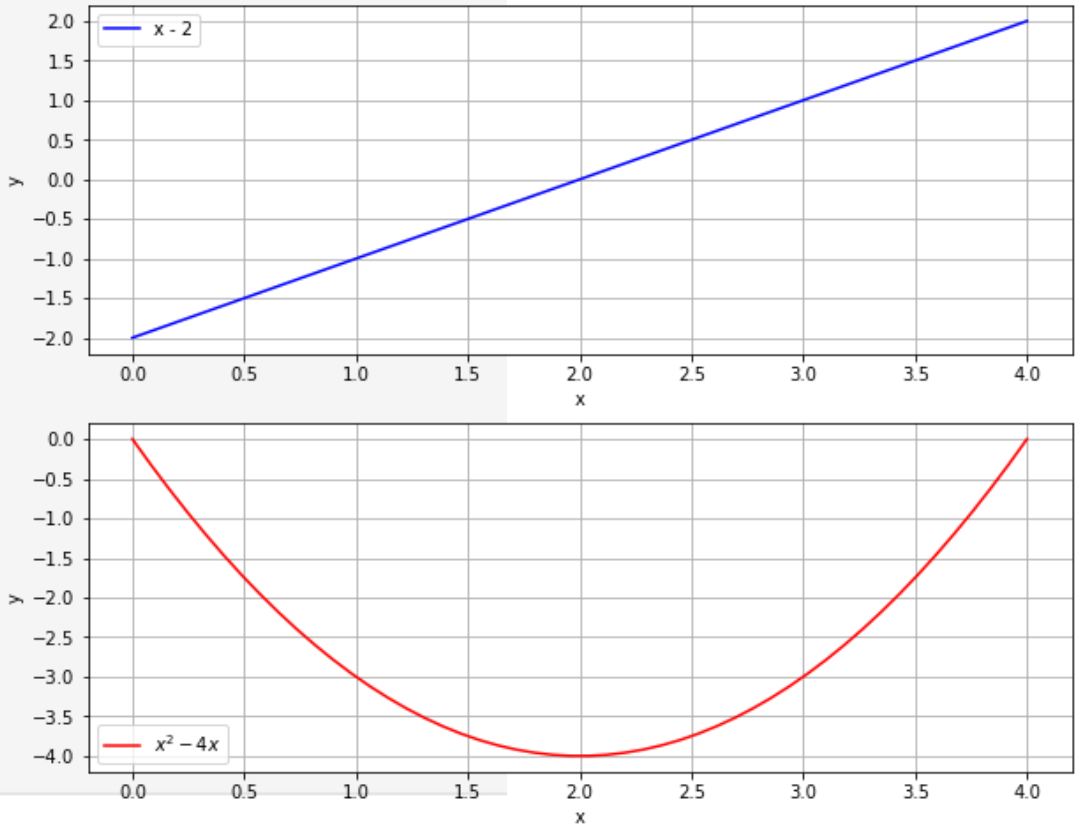
Working with multiple line plots

[3]:
```
fig, ax = plt.subplots()  # a figure with a single axes

x = np.linspace(0, 4)
y1 = x - 2
y2 = x**2 - 4*x

plt.plot(x, y1, label = '$y = x - 2$')
plt.plot(x, y2, label = '$y = x^2 - 4$')
plt.grid(True)
plt.xlabel('x')
plt.ylabel('y')
plt.legend()
plt.show()
```



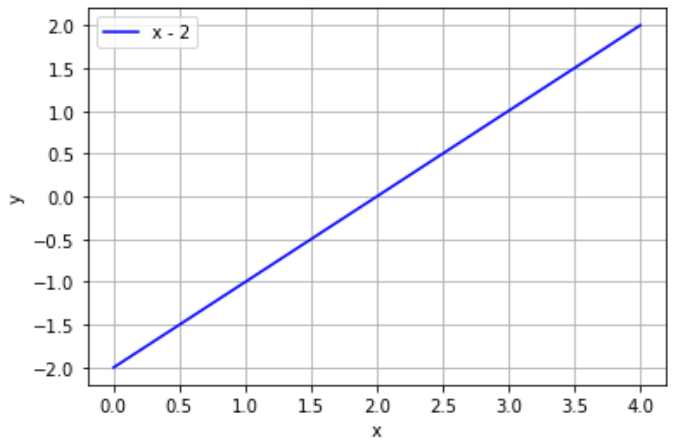
Working with multiple axes

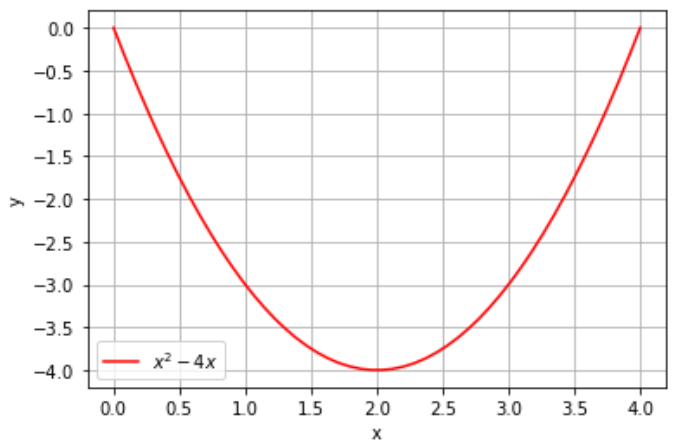
[4]:
```
fig, ax = plt.subplots(2, figsize = (10, 8))  # Create a figure containing two axes

x = np.linspace(0, 4)
y1 = x - 2

plt.sca(ax[0])
plt.plot(x, y1, color = 'b', label = 'x - 2')
plt.grid(True)
plt.xlabel('x')
plt.ylabel('y')
plt.legend()

y2 = x**2 - 4*x

plt.sca(ax[1])
plt.plot(x, y2, color = 'r', label = '$x^2 - 4x$')
plt.grid(True)
plt.xlabel('x')
plt.ylabel('y')
plt.legend()
plt.show()
```



Working with multiple figures

[5]:
```
fig1, ax1 = plt.subplots()  # Create a figure containing an axes

x = np.linspace(0, 4)
y1 = x - 2

plt.plot(x, y1, color = 'b', label = 'x - 2')
plt.grid(True)
plt.xlabel('x')
plt.ylabel('y')
plt.legend()

y2 = x**2 - 4*x

fig2, ax2 = plt.subplots()  # Create another figure containing an axes

plt.plot(x, y2, color = 'r', label = '$x^2 - 4x$')
plt.grid(True)
plt.xlabel('x')
plt.ylabel('y')
plt.legend()
plt.show()
```





Next steps

- Practice – Lab 2
  - Notebook can be found from OMA assignments
  - Moodle has code checking and verify
- Read more
  - Matplotlib 3.5.3 documentation
    - Basic Usage
    - Pyplot tutorial